

CHAPTER 6

SEWER PUMP STATION ASSESSMENT AND REHABILITATION PLAN

6.1 INTRODUCTION

This chapter summarizes the condition assessment of the City's existing sewer pump stations (SPS). Objectives of the assessment included identification of SPS deficiencies and recommended improvements, development of improvement cost estimates, and prioritization of the identified upgrades in a SPS Rehabilitation Plan integral to the Master Plan.

At the time of the City's last Wastewater Master Plan in 1990, the following 11 pump stations were operational: Marina, Tideland, Sandpiper, G Street, C. Vista Woods, Mission Verde, Deer Park, Corral Court, Surrey Place, Police Department, and Ed Hall. Since then, eleven new pump stations have been constructed and eight pump stations have been decommissioned. City pump stations that are currently operational include:

- Auto Park (temporary)
- G Street
- Hilltop Drive
- Max Field Reinstra Sport Complex
- Olympic Training Center II
- Woodcrest Terranova (Parkside Drive)
- PUBLIC Service Building
- Robinhood Ranch II
- Robinhood Ranch III
- EastLake Parkway (temporary)
- Otay Lakes Boat House (owned and operated by OTC)
- Marina (owned and operated by Port Authority)
- Sandpiper (owned and operated by Port Authority)
- Tidelands (owned and operated by Port Authority)

The City's pump stations are shown in Figure 6-1. Note that the Auto Park, Olympic Training Center, and EastLake Parkway pump stations were not included in the assessment since they are scheduled for decommission in the near future. Additionally, the Otay Lakes Boat House SPS, which is located within the Olympic Training Center, and the Marina, Sandpiper, and Tidelands

SPS were not included in the assessment since they are owned and operated by other agencies. City operations staff has indicated that the Boat House SPS has no existing deficiencies.

6.2 METHODOLOGY

On November 4, 2003 PBS&J met with staff from the City Public Works Department to conduct site visits at seven SPS. The tour included the following facilities: Public Service Building SPS, G Street SPS, Hilltop Drive SPS, Woodcrest Terranova SPS, Max Field Reinstra Sport Center Complex SPS (Max Field SPS), and Robinhood Ranch Unit II and III SPS.

The purpose of the site visits was for PBS&J to become familiar with the facilities, assess their overall condition, and check for any readily identifiable operational problems. The visits also provided a forum to discuss and record the City's concerns and requests for upgrades at each facility.

Subsequently, each pump station was evaluated in general, based on accepted sewer pump station design standards, and in particular, on the City Pump Station Design Standards (Subdivision Manual, Section 3: General Design Criteria) (City Standards). Each pumping station was assessed in terms of pumping capacity, system redundancy, operations reliability, safety and ease of operation, and environmental issues and community interests. The following sections summarize the criteria used in each category.

Pumping Capacity

Installed pump station capacity was evaluated and compared against projected flows to ensure it meets or exceeds 130 percent of projected peak flows as required by City Standards. Since this assessment will form a technical basis for the General Plan Update, the pump stations were analyzed for their ability to support the ultimate buildout of the tributary area. Installed pumping capacity assumes that existing pumps operate at their best efficiency point. Operational data were derived from manufacturer pump curves for the type, model, and motor speed identified in the O&M SPS data book. Catalog-cut sheets and operational data are included in Appendix G. Flow projections are based on assumed buildout of all vacant parcels draining to each pump station per current City zoning.

System Redundancy

System redundancy is evaluated in terms of emergency storage capacity, number and capacity of stand-by pumps, availability of alternate power sources, and by-pass pumping capabilities.

Large stations were checked for conformance to City Standards. This includes possessing emergency storage capacity for 6 hours of average daily flow, a stand-by pump unit rated for peak flow conditions, an emergency generator, and a by-pass emergency pump connection.



For small stations, it is considered preferable to achieve system redundancy by upsizing the emergency storage to 12 hours and relaxing the emergency generator requirements. In lieu of an on-site emergency generator, a portable generator was recommended to be shared between pairs of stations based on cost and operational and maintenance considerations. The larger storage volume guards against spills in case of electrical or mechanical failures. The elimination of a generator building also helps to solve space constraints and meet the aesthetic requirements for these smaller facilities that are usually located in residential areas.

Operations Reliability

Station reliability was evaluated based on the adequacy of existing controls, monitoring and alarm systems. Equipment requiring immediate replacement or corrective maintenance and deteriorated structures were assessed in terms of the risk to impair facility operations.

Remote monitoring, though considered a critical feature to each sewer pump station, was not covered in this rehabilitation plan. In effect, a planned SCADA system that the City is currently implementing will provide this capability.

Safety and Ease of Operation

A preliminary and qualitative assessment of the facilities is conducted with respect to safety and ease of operation. This includes: general layout, vehicle access, equipment clearances, hoisting capabilities, ventilation, and code compliance.

Environmental Issues and Community Interests

The potential impact of the facilities to the environment and community was evaluated in terms of aesthetics (architecture and landscaping), noise, odor control, drainage, and impact of spills.

The proximity of residences and the potential impact of wet well overflows was generally taken into account with the sizing of the emergency storage beyond City Standard requirements as previously discussed.

6.3 SEWER PUMP STATION RECOMMENDED IMPROVEMENTS

In the following sections, each facility is reviewed and analyzed with respect to the aforementioned criteria. Items requiring improvements are highlighted, and a rehabilitation plan and estimates for the associated capital costs are presented. Construction cost estimates for each major rehabilitation item include an additional 15 percent for Contractor overhead and profit and carry a contingency of 40 percent. Engineering and administration costs are estimated as 20 percent of construction costs. Descriptions of station equipment are provided in Appendix G.

PS-01: Public Service Building SPS

The facility, which serves the Police Station, is located at 276 Fourth Avenue in the Public Service Building basement. Two self-priming pumps are installed next to a 36-inch circular lid that seals the wet well underneath. Control panels are wall mounted at the side of the pumps. No physical boundaries separate the two installed pumps and associated piping from the rest of the basement (see Figures 6-2 and 6-3).

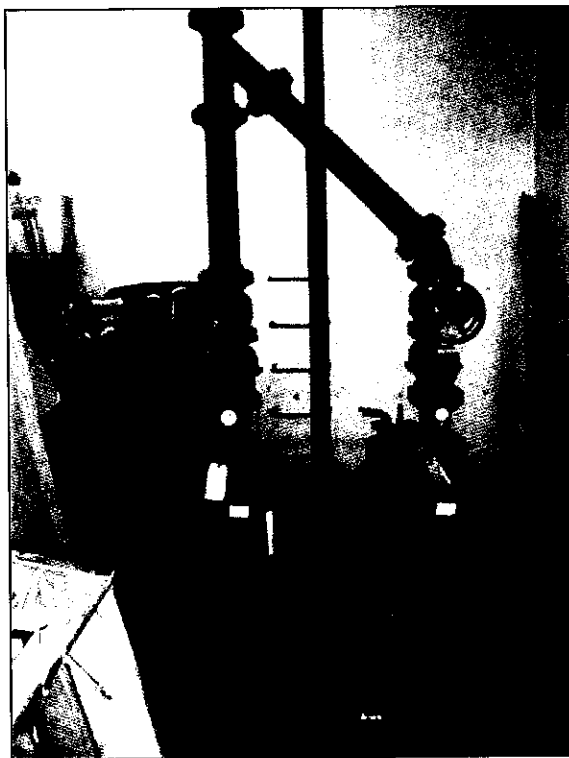


Figure 6-2. Public Service Building SPS front view



Figure 6-3. Public Service Building SPS back

Access to the station for operation and maintenance tasks is inadequate. The station can only be accessed through the main entrance after clearing security and using an elevator. Hazardous conditions could potentially develop as a result of the actual pump station configuration, as gas contained in the wet well could leak through the lid and contaminate the basement.

City engineers are currently undertaking a design to upgrade the station as part of planned building renovations. It is recommended that the design consider relocating the station outside of the Public Service Building. Conceptually, the new station would feature submersible pumps, an underground valve vault, and pedestal mounted electrical panels to address space constraints. It is also recommended that the station be constructed with 6 hours of emergency storage and connection to an existing generator located on site be made to enable operation of the station during a power failure. An opinion of probable cost for these improvements is included in Table 6-1.

Table 6-1
Capital Cost Estimate for Public Service Building SPS Improvements

Description	Estimated Cost
Pump Station	\$140,000
Emergency Storage	\$120,000
Emergency Generator	\$30,000
Engineering and Administration	\$60,000

The estimated total capital cost for the recommended upgrades amounts to \$350,000.

PS-02: G Street SPS

Located at 890 G Street, the station is built in a dry pit/wet pit configuration. Two self-priming pumps, the motor control center, and the electrical panels are located in the underground dry pit. A sluice gate that controls the flow into the station is housed in the wet well intermediate level (see Figures 6-4 and 6-5).



Figure 6-4. G Street SPS Pump Room



Figure 6-5. G Street SPS Wet Well

Sewer Pump Station Assessment & Rehabilitation Plan

The G Street SPS serves a 150-acre industrial park with approximately 67 acres of vacant land. Built out conditions could increase the pump station's average daily wastewater flow from currently 0.2 mgd to an estimated 0.4 mgd. Installed capacity seems adequate to accommodate this increase in flow and satisfy the safety factors recommended in the City Standards.

Major rehabilitation is required to bring this station up to standard and to limit the risk of spills to the adjacent environmentally sensitive bay front. Installation of an emergency storage reservoir and an emergency generator are recommended to increase system redundancy. Electrical controls should be relocated above ground to diminish the risk of electrical damage during flooding. Additionally, the wet well may need to be upgraded to solve the problem of frequent pump cycling reported by the City. The extent of these improvements may warrant relocating the station nearby. The cost of this approach is presented in Table 6-2.

Table 6-2
Capital Cost Estimate for G Street SPS Improvements

Description	Estimated Cost
New Pump Station	\$800,000
Emergency Storage	\$850,000
Emergency Generator	\$50,000
Odor Control System	\$50,000
Engineering and Administration	\$350,000

The estimated total capital cost for the replacement of the station amounts to \$2,100,000.

PS-11: Hilltop Drive SPS

Hilltop Drive SPS is located at 940 Hilltop Drive by a church and school parking lot. The facility comprises a 4-foot wet well with two submersible pumps, exposed valve assemblies, emergency pump connection, and a pedestal-mounted control panel. The whole facility occupies a 12 by 15 foot footprint (see Figures 6-6 and 6-7).

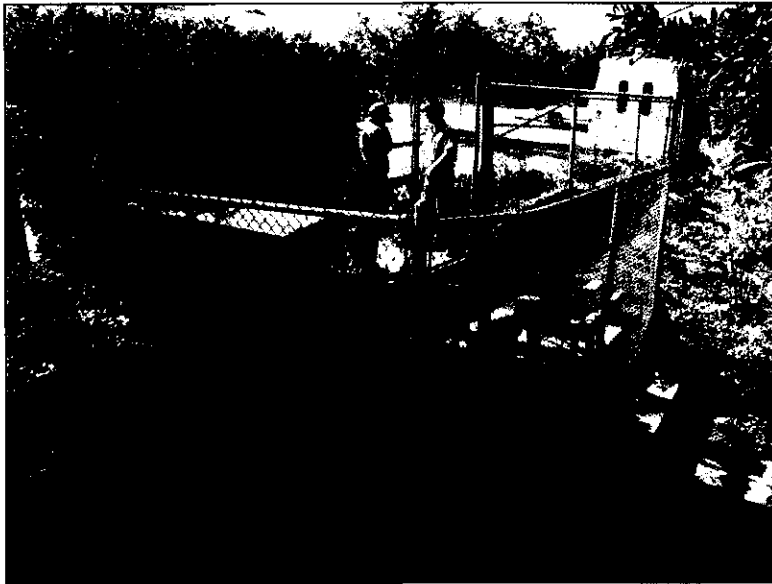


Figure 6-6. Hilltop Drive SPS Overview



Figure 6-7. Hilltop Drive SPS Control Panel

Installed pump capacity exceeds anticipated flows by a large amount. This is a typical condition with small sewer pump stations where solid handling capacity ends up being the controlling factor in pump sizing.

Challenges associated with Hilltop Drive SPS include difficult access, a very limited footprint, and no installed hoisting equipment capabilities. The City requested that the wet well be retrofitted with a liner to prevent further corrosion in the wet well. Grading and landscaping are recommended to improve the drainage and aesthetics of the site.

Replacement of the facility with a submersible pump station is proposed. The new station would feature a new lined wet well with guide rails for easy installation and removal of pumps, an underground valve vault to facilitate maneuverability in the station, and the underground emergency storage discussed previously. An estimate of the capital cost associated with these improvements is listed in Table 6-3.

Table 6-3
Capital Cost Estimate for Hilltop Drive SPS Improvements

Description	Estimated Cost
New Pump Station	\$150,000
Emergency Storage	\$120,000
Engineering and Administration	\$50,000

The estimated total capital cost for the pump station replacement amounts to \$320,000.

PS-12: Woodcrest Terranova (Parkside Drive) SPS

Located at 598 Parkside Drive, the station consists of a fiberglass enclosure that houses two belt-driven self-priming pumps. The facility features a gas driven engine to operate one of the pumps in case of power failure and underground emergency storage (see Figures 6-8 and 6-9).

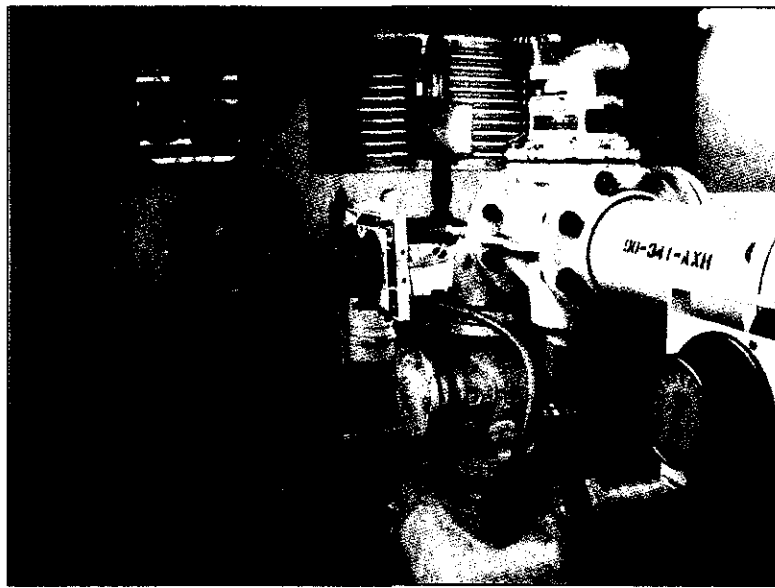


Figure 6-8. Wood Crest Terranova SPS Pump Room

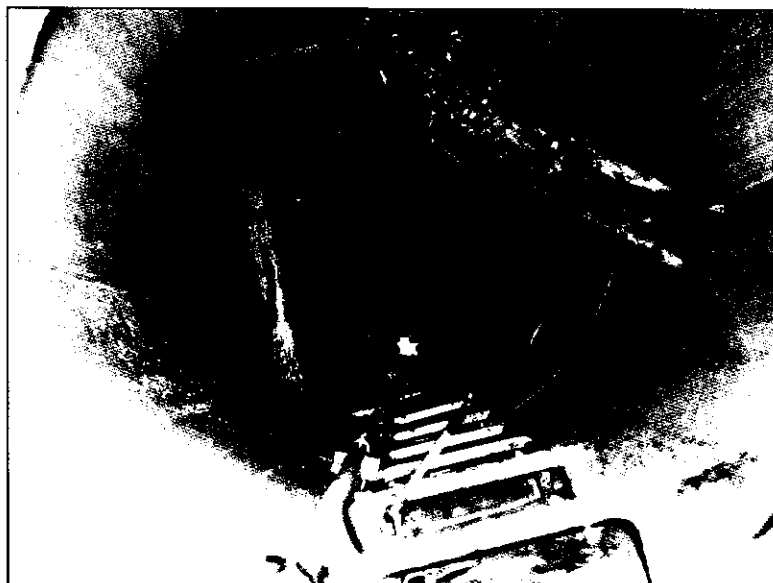


Figure 6-9. Wood Crest Terranova SPS Wet Well

Capacity at the pump station is adequate. System redundancy features are considered satisfactory for Woodcrest Terra Nova SPS. The size and configuration of the wet well, however, promote the accumulation of solids and the release of odors.

Recommended improvements include upgrades to the hydraulic connection between the emergency storage and wet well, and enhancing the hydraulic characteristics of the wet well. Provide a backup source of fuel for the emergency generator; this could be accomplished through the installation of a propane tank or a compressed natural gas tank.

Table 6-4
Capital Cost Estimate for Woodcrest Terranova SPS Improvements

Description	Estimated Cost
Storage and Wet Well Improvements	\$160,000
Engineering and Administration	\$30,000

The estimated total capital cost for the recommended upgrades amounts to \$190,000.

PS-15: Max Field SPS

Located in the Max Field Reinstra Sport Complex at 1500 Max Avenue, the sewer pump station serves the bathrooms and concessions of the sport complex. Flows are pumped via a 0.5 hp submersible pump and 3-inch forcemain into the Palm Canyon sewer line located across the field (see Figures 6-10 and 6-11).

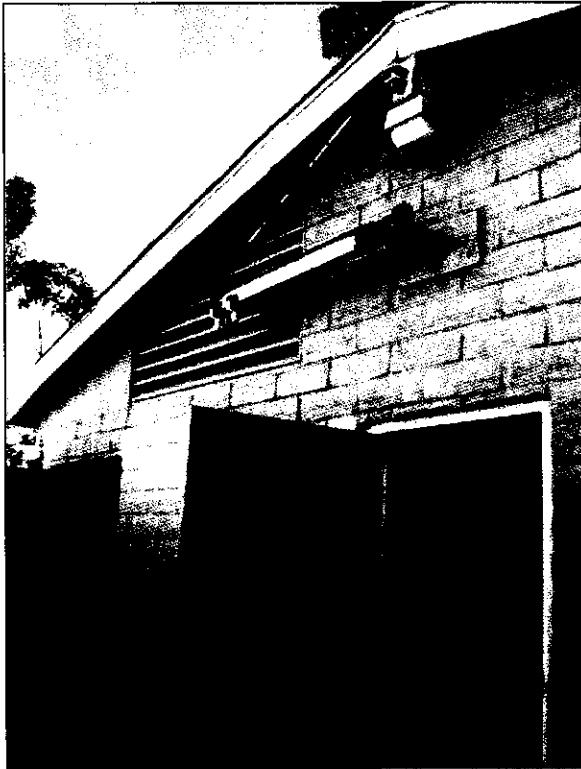


Figure 6-10. Max Field SPS Control Panel



Figure 6-11. Max Field SPS Wet Well

Twelve hours of average emergency storage is the main upgrade proposed for this facility. Miscellaneous upgrades include the installation of a hatch over the wet well, the procurement of a spare pump, and the replacement of the electrical panel with a pedestal mounted control panel in a NEMA rated enclosure. It is recommended that the proposed upgrades be coordinated with future restroom ADA upgrades. An estimate of the capital cost associated with these improvements is presented in Table 6-5.

Table 6-5
Capital Cost Estimate for Max Field SPS Improvements

Description	Estimate Cost
Pump Station Rehabilitation	\$40,000
Emergency Storage	\$20,000
Engineering and Administration	\$20,000

The estimated total capital cost for the recommended upgrades amounts to \$80,000.

PS-24: Robinhood Ranch II

This facility, located in a park by a cul-de-sac at 277 Survey Drive, is identical to the Hilltop Drive SPS. The station comprises a 4-foot diameter wet well with two submersible pumps, exposed valve-assemblies, emergency pump connection, and a pedestal mounted control panel (see Figures 6-12 and 6-13).



Figure 6-12. Robinhood Ranch II SPS



Figure 6-13. Robinhood Ranch II SPS
Valve Assembly

Recommended upgrades include 12 hours of underground emergency storage, site grading and landscaping to improve drainage and aesthetics. Long-term improvements include construction of a new wet well with submersible pumps mounted on guide rails and an underground valve vault. The estimate for the total capital cost of these upgrades is presented in Table 6-6.

Table 6-6
Capital Cost Estimate for Robinhood Ranch II SPS Improvements

Description	Estimate Cost
Pump Station	\$100,000
Emergency Storage	\$120,000
Emergency Generator	\$10,000
Engineering and Administration	\$40,000

The estimated total capital cost for the recommended upgrades amounts to \$270,000.

PS-25: Robinhood Ranch III

Located in a cul-de-sac at 375 Corral Court, by the sidewalk, the station comprises two self-priming pumps installed on top of an underground wet well. The station services approximately 14 neighboring lots (see Figures 6-14 and 6-15).



Figure 6-14. Robinhood III SPS Overview



Figure 6-15. Robinhood III Pump Enclosure

In the past, pump failures have caused the flows to backup into the house located just north of the station; provision of emergency storage is a critical feature for this facility. Noise complaints and aesthetic considerations and limited accessibility to station equipment are the basis for the recommendation of replacement of this facility with a submersible pump station. The City desires installation of an on-site back-up generator since the area is prone to power outages, and has required the intervention of City crews in the past. Furthermore, due to the proximity of adjacent homes a pump failure has a high potential to result in wastewater discharge into adjacent properties.

Table 6-7
Capital Cost Estimate for Robinhood Ranch III SPS Improvements

Description	Estimate Cost
Pump Station	\$140,000
Emergency Storage	\$120,000
Engineering and Administration	\$50,000

The estimated total capital cost for the recommended upgrades amounts to \$310,000.

6.4 RECOMMENDED REHABILITATION PLAN

Preliminary recommendations were presented and discussed in a meeting with the City on February 18, 2004. A two-phase Rehabilitation Plan was developed with City staff in which improvements were classified as immediate (Phase 1) or long-term (Phase 2).

Phase 1 of the Rehabilitation Plan comprises improvements to the Public Service Building SPS and G Street SPS. The capital cost of the Phase 1 improvements totals \$2,450,000.

Phase 2 comprises upgrades to the Hill Top Drive SPS, Woodcrest Terranova SPS, Max Field SPS and Robinhood Units II and III SPS. The total capital cost for Phase 2 amounts to \$1,170,000.

Tables 6-8 and 6-9 present the capital costs of each phase of the Rehabilitation Plan with a breakdown of the recommended improvements per station.

Sewer Pump Station Assessment & Rehabilitation Plan

Table 6-8
Phase 1 Improvement Program

Sewer Pump Station	Recommended Improvements	Capital Costs
Public Service Building (SPS-01)	New pump station with: Lined wet well Submersible pumps with guide rails Underground valve vault with hatch 6 hours of Emergency Storage Emergency Generator Electrical Controls Landscaping	\$350,000
G Street (SPS-02)	New pump station with: Dry well / Wet Well configuration Emergency Generator Positive ventilation of dry well Odor Control System 6 hours of Emergency Storage	\$2,100,000

**Table 6-9
Phase 2 Improvement Program**

Sewer Pump Station	Recommended Improvements	Capital Costs
Hill Top Drive (SPS-11)	New pump station with: Lined wet well Submersible pumps with guide rails Underground valve vault with hatch 12 hours of Emergency Storage Electrical Controls Portable Emergency Generator (shared) Landscaping	\$320,000
Woodcrest Terranova (SPS-12)	Wet well / Emergency Storage reconfiguration	\$190,000
Max Field (SPS-15)	Spare Pump Unit 12 hours of Emergency Storage New Electrical Panel Install aluminum hatch over wet well	\$80,000
Robinhood Ranch Unit II (SPS-24)	12 hours of Emergency Storage Grading and Drainage Improvements Landscaping	\$270,000
Robinhood Ranch Unit III (SPS-25)	New pump station with: Lined wet well Submersible pumps with guide rails Underground valve vault with hatch 12 hours of Emergency Storage Electrical Controls Portable Emergency Generator (shared)	\$310,000

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